PRODUCT PERFORMANCE / EFFICACY REVIEW

Mark Suarez, Entomologist - IB

Mark E. Suarez
15 January 2009

DATE:	15 January 2009
EPA REG. NUMBER:	7969-EIL
PRODUCT NAME:	Formula 2873
REGISTRANT:	BASF Corporation
PM:	Richard Gebken, PM 10
REVIEWER:	Ann Sibold
DECISION #.:	397016
DP BARCODE:	355380
ACTION:	R310
ACTIVE INGREDIENT(S):	129093, Chlorfenapyr.....0.5%
TYPE:	RTU Spray
OPPTS GUIDELINE(S):	810.3500

MRID:		
43492801	Cited	GLP? No.
44329801	Cited	GLP? No.
44611701	Cited	GLP? No.
45758101	Cited	GLP? No.
46710106	Cited	GLP? No.
46710107	Cited	GLP? No.
46710108	Cited	GLP? No.
46710109	Cited	GLP? No.
47469401	Submitted	GLP? No.
47469402	Submitted	GLP? No.
47469403	Submitted	GLP? No.
47469404	Submitted	GLP? No.
47469405	Submitted	GLP? No.
47469406	Submitted	GLP? No.
47469407	Submitted	GLP? No.
47469408	Submitted	GLP? No.

SITES & PESTS	Ants (Carpenter and Pharaoh), Scorpions, Bed Bugs, Centipedes, Cockroaches, House Flies, Paper Wasps, Spiders (Black Widow), Termites	Indoor and Outdoor use

LABEL APPLICATION RATE: 2 sec/linear feet or 3 seconds/cubic foot

STUDY APPLICATION RATE: Variable; see study summaries

STUDY SUMMARY

Cited Studies:

DERs for the studies listed below were generated in support of a previous registration [EPA Reg. No. 241-392]. The efficacy reviews dated 26 April 2006 and 2 October 2006 are enclosed. The previous reviewer found that the product was efficacious at the appointed concentration against the pests listed:

0.25% chlorfenapyr solution efficacious against'

- Black widow spider
- Bark Scorpions (not Striped Tail Scorpion)
- Centipedes
- Oriental Cockroach
- Paper Wasp (No Knockdown)

0.50% chlorfenapyr solution efficacious against:

- Bed bugs
- Houseflies
- Termites

MRID 44329801. Reid, B. (1997) Chlorfenapyr Termiticide-Insecticide: Summary of Termite Control Efficacy: Lab Project Number: CY-157. Unpublished study prepared by American Cyanamid Co. 63 p.

MRID 44329801. Reid, B. (1997) Chlorfenapyr Termiticide-Insecticide: Summary of Termite Control Efficacy: Lab Project Number: CY-157. Unpublished study prepared by American Cyanamid Co. 63 p.

MRID 44611701. American Cyanamid Company (1998) Chlorfenapyr Termiticide-Insecticide: Summary of Efficacy Data: Lab Project Number: CY 197: 215-95: 4510. Unpublished study. 102 p.

MRID 45758101. Scheffrahn, R.; Maharajh, B.; Krecek, J. (2001) Comparative Efficacy of Residual Treatments for Control of the Southeastern Drywood Termite Incisitermes snyderi (Isoptera: Kalotermitidae) Using a Laboratory Choice Bioassay: Phantom Termiticide-Insecticide: Lab Project Number: 2001/5003690. Unpublished study prepared by University of Florida. 9 p. {OPPTS 810.3600}

MRID 46710106. Kirkland, R. (2005) Laboratory Evaluation of Termidor SC and Phantom in the Control of the Black Widow Spider, Wolf Spider, Boxelder Bug, European Earwig, Pillbug, Asian Lady Beetle, Darkling Beetle, and Bed Bug. Project Number: 119/04, 2005/7003300. Unpublished study prepared by Bio Research. 52 p.

MRID 46710107. Kirkland, R. (2005) Evaluation of Termitidor SC and Phantom in the Control of the Bark Scorpion, Centipede, Cellar Spider, Millipede, Silverfish, and Brown Dog Tick. Project Number: 204/03, 2005/7003301. Unpublished study prepared by Bio Research. 33 p.

MRID 46710108. Foard, T. (2005) Evaluation of a Phantom-Based Direct Spray Against Saw-Toothed Grain Beetles and Confused Flour Beetles. Project Number: 097/0034, 2005/7003302. Unpublished study prepared by Insect Control and Research Inc. 40 p.

MRID 46710109. Donahue, W. (2005) Knockdown Efficacy Evaluations of PHANTOM and Termidor Against Selected Arthropod Pest Species in the Laboratory. Project Number: BAS03/3A, 2005/7003303. Unpublished study prepared by Sierra Research Labs./ Dominion Res. 90 p.

MRID 46710110. Foard, T. (2005) Evaluation of a Phantom-Based Direct Spray Against House Flies. Project Number: 097/0035, 2005/7003305. Unpublished study prepared by Insect Control and Research Inc. 21 p.

Submitted Studies:

MRID 47469401. Gordon, C. (2008) Bioactivity of Formula 2873 Against Non-Crop Insects via Direct Spray Assays. Project Number: 2008/7010288, 034. Unpublished study prepared by BASF Corporation. 17 p.

The study tested the effectiveness of 0.5% chlorfenapyr formulation (Formulation 2873) and Cy-Kick aerosol [0.1% cyfluthrin; EPA Reg. No. 499-470] against 10 adult male German cockroaches (*Blattella germanica*), 8 adult and last instar nymph Oriental cockroaches (*Blatta orientalis*), 10 adult male American cockroaches (*Periplaneta americana*),and 10 house flies (*Musca domestica*). In addition, Formula 2873 was tested against 20 late instar worker Eastern subterranean termites (*Reticulitermes flavipes*) and 20 worker Pharaoh ants (*Monomorium pharaonis*) under laboratory conditions.. An average of 3.21g of Formula 2873 and 5.18g of Cy-Kick in a 1 second burst directly to caged insects. All insects were transferred to clean holding containers after treatment, except houseflies. Knockdown was recorded at 0.5, 1, 2, and 4 hours after treatment (HAT).Mortality was recorded at 1 and 2 days after treatment (DAT). Untreated controls were also run. Five replicates were run for each species tested.

The data indicated that the chlorfenapyr product provided >90% knockdown of house flies and pharaoh ants within one-half hour, termites within 2 hours, and American cockroaches within 4 hours. One hundred percent mortality was reported for all German cockroaches, American cockroaches, house flies, termites, and pharaoh ants 1 DAT. 97.5% of Oriental cockroaches were dead 1 DAT and 100% mortality was reported 2 DAT. The cyfluthrin formulation provided 100% knockdown at 0.5 HAT and 100% mortality 1 DAT for all species tested(German cockroaches, American cockroaches, Oriental cockroaches, and house flies). Control mortalities were within acceptable parameters to assess the performance of the test formulations.

MRID 47469402. Gordon, C. (2008) Bioactivity of Formula 2873 Against Non-Crop Insects via Residual Exposure Assays . Project Number: 2008/7010287, ATII/002, ATII/011. Unpublished study prepared by BASF Corporation. 38 p.

The data submitted were generated in trials testing the repellency and residual effectiveness of Formula 2873 and/or Cy-Kick against German cockroaches, house flies, and pharaoh ants.

In repellent tests, German cockroaches (10) were placed into test arenas with glass microscope slides sprayed with the Formula 2873 (1 sec/3 linear feet) inside their harborage or untreated control slides. The presence of cockroaches outside the harborage was recorded at 0.5, 1, 4, and 24 hours. Five replicate were run.

For residual testing, test substances were applied to 2'x2' test panels of on vinyl tile, ceramic tile, unpainted plywood, and painted plywood as aerosols from a distance of 12", depositing an average of 3.21g of Formula 2873 and 5.18g of Cy-Kick. House flies (10), German cockroaches (5 or 10), and pharaoh ants (20) were then exposed to the treated surfaces for up to 3 days. Knockdown was recorded at 1 and 4 hours after initiation of exposure and mortality recorded as necessary on 1, 2, 3, 5, and 7 days after initiation of exposure. Four replicates were run.

The repellency trials the mean number of cockroaches present in the harborages did not appear to be affected by the presence of insecticide, relative to the untreated controls. The data do not fully support assertions that the formulation is not repellent to German cockroaches, as the application rate employed was far below the demonstrated rate of effectiveness. In fact, the low mortality rate after 1 day of exposure reported for treated harborages underscores this fact.

In residual activity trials, the insects were continually exposed to the treated surface for the duration of the trial. The data demonstrated that under the test conditions the product provided complete control of house flies within 1 day for up to 2 weeks on vinyl and ceramic tiles and unpainted plywood. The product was less efficacious against houseflies on painted plywood. Two day aged samples provided 100% control at 1 day, samples aged 1 week provided 90.8% control at 1 day, and samples aged 2 weeks killed 98.2% at 2 days after exposure initiation. Control of German cockroaches for up to 2 weeks on vinyl and ceramic tiles and unpainted and painted plywood was achieved. But, 7 days was required for painted wood surfaces. Against pharaoh ants, the product provided complete control on all surfaces within 1 day of exposure.

The data provided in this MRID are not acceptable because the study design failed to demonstrate that the product is not repellent according to the directions for use on the label and the exposure length in the residual studies is unrealistic without demonstrating that the product is non-repellent.

MRID 47469403. Hansen, L. (2006) Laboratory Study on Efficacy of Formula 2873 on Carpenter Ants (Camponotus modoc). Project Number: 2008/7011400. Unpublished study prepared by Spokane Falls Community College. 10 p.

The data submitted were generated from direct spray against and residual exposure of Western carpenter ants (*Camponotus modoc*) to surfaces treated with Formula 2873 (0.050% chlorfenapyr), 0.1% cyfluthrin (Cy-Kick), or 0.25% chlorfenapyr (Phantom). In direct spray assays, 20 carpenter ant workers were directly contacted with 3.2g Formula 2783, 4.6g Phantom, 2.2g Cy-Kick, or 9.2g water. Ants mortality was recorded at 5, 15, and 60, minutes and 3, 6, and 24 hours. Three replicates were conducted.

Residual trials involved forced exposure to treated vinyl tile, Plexi glass, and wood surfaces treated with 9.8g Formula 2783, 10.3g Phantom, 10.4g Cy-Kick, or 9.8g water and allowed to dry for 5 hours. Twenty worker ants were placed into nesting containers (14 cm^2 by 5cm) and allowed to acclimate overnight. Treated tiles10 cm^2 were placed into the nesting boxes and ants were observed at 1, 3, 24 hours and daily through 5 days. Three replicates were run.

The direct spray assay data demonstrated adequate kill of carpenter ants after 24 hours when directly contacted with the pesticide. The residual data provided are not informative due to the continuous exposure of insects to pesticide over the entire trial period. These data can not be interpret due to the forced exposure of ants to the treated surfaces and lack of information regarding the repellency of the product.

MRID 47469404. Buczkowski, G. (2008) Laboratory Evaluation of Formula 2873 (Chlorfenapyr; Lot #LPDD050108B) Against the BrownBanded Cockroach, Supella longipalpa. Project Number: 2008/7011401. Unpublished study prepared by Purdue University. 11 p.

The data submitted tested the direct spray and residual effectiveness of the subject formulation and Cy-Kick CS against the brownbanded cockroach, *Supella longipalpa*.

In direct spray tests, brownbanded cockroaches (10; 5 males, 5 final instar nymphs) were placed into a Petri dish and sprayed with the Formula 2873 (1 sec). Cockroach mortality was recorded 0.5, 1, 2, 4, and 24 hours after treatment. Five replicate were run.

In residual trials, test substances were applied to 4" x 4" test panels of ceramic tiles or unpainted plywood as aerosols from a distance of 12" at a rate of 11 sec/2 ft^2 for both Formula 2873 and Cy-Kick CS. The treated tiles were allowed to dry overnight. Cockroaches were then force exposed to the treated surfaces for up to 24 hours. Mortality recorded as necessary at 0.5, 1, 2, 4, and 24 hours after initiation of exposure. Five replicates were run.

Both the direct contact and residual exposure trials resulted in adequate cockroach mortality. However, as noted for previous studies, the duration of exposure exceeds the generally accepted forced exposure duration – as non-repellency has not been demonstrated.

MRID 47469405. Snell, E.; Weiner, D. (2005) Evaluation of Phantom SC 0.5%, Formula 2873 (Lot #LPB40406A), Bifenthrin PRO 0.06%, Bifenthrin PRO 0.06% Plus Phantom SC 0.5%, Phantom SC 0.5% Plus Gentrol 1.0%, and Suspend SC 0.06% when Applied as a Direct Spray to 10 Adult Bedbugs (Cimex lectularius) per Replicate. Project Number: 2008/7011402. Unpublished study prepared by Snell Scientifics, LLC. 11 p.

The data submitted tested the direct spray effectiveness of the subject formulation, Phantom SC 0.5%, Bifenthrin Pro 0.06%, Bifenthrin Pro 0.06% + Phantom SC 0.5%, Suspend SC 0.06%, and a water control against the bed bugs, *Cimex lectularius*. In the tests, bed bugs (10 adults) were placed into a small screened test chamber and sprayed with the appropriate formulation (1 mL from 2.5"). Bed bug knockdown and mortality were recorded 0.25, 0.5, 1, 4, 24, 48, and 72 hours after treatment. Four replicate were run.

The direct contact exposure to the subject formulation resulted in adequate bed bug mortality by 48 hours. The results for other formulations (Phantom SC 0.5%, Bifenthrin Pro 0.06%, Bifenthrin Pro 0.06% + Phantom SC 0.5%, and Suspend SC 0.06%) indicated that the products worked more quickly, producing 100% mortality with 24 HAT. No mortality was observed for the duration of the trial in the water control.

The data provided are not informative due to the continuous exposure of insects to pesticide over the entire 48 hours required to achieve adequate mortality – exposure occurred over the entire 72 trial period.

MRID 47469406. Snell, E.; Weiner, D. (2005) Evaluation of Phantom SC 0.5%, Formula 2873 (Lot #LPB40406A), Bifenthrin PRO 0.06%, Bifenthrin PRO 0.06% Plus Phantom SC 0.5%, Phantom SC 0.5% Plus Gentrol 1.0%, and Suspend SC 0.06% when Applied to a Glass Petri Dish and Exposed to 10 Adult Bedbugs (Cimex lectularius) per Replicate . Project Number: 2008/7011403. Unpublished study prepared by Snell Scientifics, LLC. 12 p.

The data submitted tested the short-term residual effectiveness of the subject formulation, Phantom SC 0.5%, Bifenthrin Pro 0.06%, Bifenthrin Pro 0.06% + Phantom SC 0.5%, Phantom 0.5% + Gentrol 1.0% and Suspend SC 0.06%, and an untreated control against the bed bugs, *Cimex lectularius*. In the tests, bed bugs (10 adults) were placed into a glass Petri dish with the bottom treated at the label application rate (per unit area). Bed bugs were placed into the Petri dish. At 4 hours after exposure, a piece of creased filter paper was introduced to the dish to provide insects harborage. Bed bug knockdown and mortality were recorded at 0.25, 0.50, 1, 2, 4, 24, 48, and 72 hours after exposure. Four replicate were run.

The short-term residual exposure to the subject formulation provided inadequate bed bug mortality by 72 hours – 85.0%, uncorrected. The results for other formulations (Bifenthrin Pro 0.06%, Bifenthrin Pro 0.06% + Phantom SC 0.5%, and Suspend SC 0.06%) indicated better performance, producing >90% mortality with 24 HAT. The remaining formulations (Phantom SC 0.5%, Phantom SC 0.5% + Gentrol 1.0%) produced >90% mortality at the 72 HAT observation interval. Mortality observed in the untreated controls was within acceptable parameters (2.5%)..

The data provided do not support residual claims for the subject formulation against bed bugs.

MRID 47469407. Snell, E.; Sexton, W.; Weiner, D. (2007) Evaluation of BASF Formula 2873 (Lot # LPB40406A) and CY-KICK 0.1% when Applied as a Direct Spray to German Cockroaches (Blattella germanica). Project Number: 2008/7011404, BASFGRODIRECT06. Unpublished study prepared by Snell Scientifics, LLC. 21 p.

The data submitted were generated in trials testing the direct spray effectiveness of Formula 2873 and/or Cy-Kick against German cockroaches. Direct spray trials with German cockroaches (10) occurred in test with screen tops and solid acrylic bottoms. Insects were directly sprayed with the Formula 2873 (1 mL from 2.5") and observed for knockdown and mortality. Knockdown and mortality observations were recorded at 0.25, 0.5, 1, 2, 4, and 24 hours. Insects were exposed to the pesticide for the duration of the trials. Four replicate were run.

The data generated indicate that the subject formulation provided >90% efficacy at 24 hours after treatment, while Cy-Kick provided 100% mortality within 15 minutes. Control mortality was with acceptable limits (3% @ 24 hours).

The data provided are not informative due to the continuous exposure of insects to pesticide over the entire 24 hour trial period.

MRID 47469408. Snell, E.; Sexton, W.; Weiner, D. (2007) Evaluation of BASF Formula 2873 and CY-KICK 0.1% when Applied as Residual Pesticides and Exposed to German Cockroaches (Blattella germanica) on Stainless Steel Panels. Project Number: BASFGROPANEL06, 2008/7011405, 310/0. Unpublished study prepared by Snell Scientifics, LLC. 19 p.

The data submitted were generated in trials testing the residual effectiveness of Formula 2873 and/or Cy-Kick against German cockroaches. Trials with German cockroaches (10) occurred in test with Petri dish tops and stainless steel bottoms. Stainless steel disks were sprayed (rate equivalent to 1 sec/ 3 linear feet) with the Formula 2873 (0.158 mL/12.56 in^2), Cy-Kick (1.716 mL/12.56 in^2), or a water control and observed for knockdown and mortality. Knockdown and mortality observations were recorded at 0.25, 0.5, 1, 2, 4, and 24 hours. Insects were exposed to the pesticide for the duration of the trials. Four replicate were run.

The data generated indicate that the subject formulation provided >90% efficacy at 24 hours after treatment, while Cy-Kick provided 100% mortality within 15 minutes. Control mortality was with acceptable limits (3% @ 24 hours).

The data provided are not informative due to the continuous exposure of insects to pesticide over the entire 24 hour trial period.

ENTOMOLOGIST'S COMMENTS AND RECOMMENDATIONS

The data cited and submitted support direct spray kill claims, no residual claims, against the following pests:

- Black widow spider
- Bark Scorpions (not Striped Tail Scorpion or general scorpion claim)
- Centipedes
- Oriental Cockroach
- Paper Wasp (No Knockdown)
- Bed bugs
- Houseflies
- Termites
- Pharaoh ants
- Ants, except Carpenter, Fire, and Harvester ants
- German cockroaches
- American cockroaches
- Cockroaches (general claim)

The data do not support claims against:

- Carpenter ants

The product has not been adequately demonstrated to provide residual control under realistic use conditions (i.e., unforced exposure).

- Remove claims that the product is a residual spray or provides any residual efficacy. (Acceptable claims are restricted to direct spray applications.)

Enclosure
007969-00EIL S832127-ER